Fire and biomass harvesting effects on nutrient cycling in the Lake Tahoe Basin

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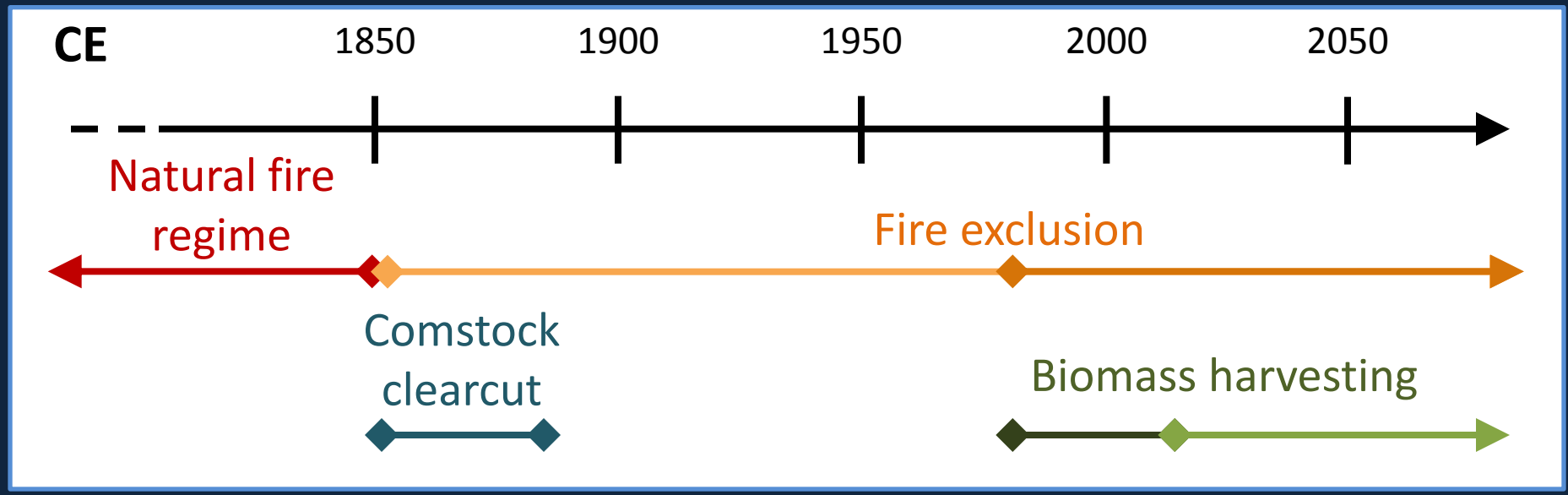
“Natural” v current conditions

UNR Special Collections

Biomass harvesting treatments

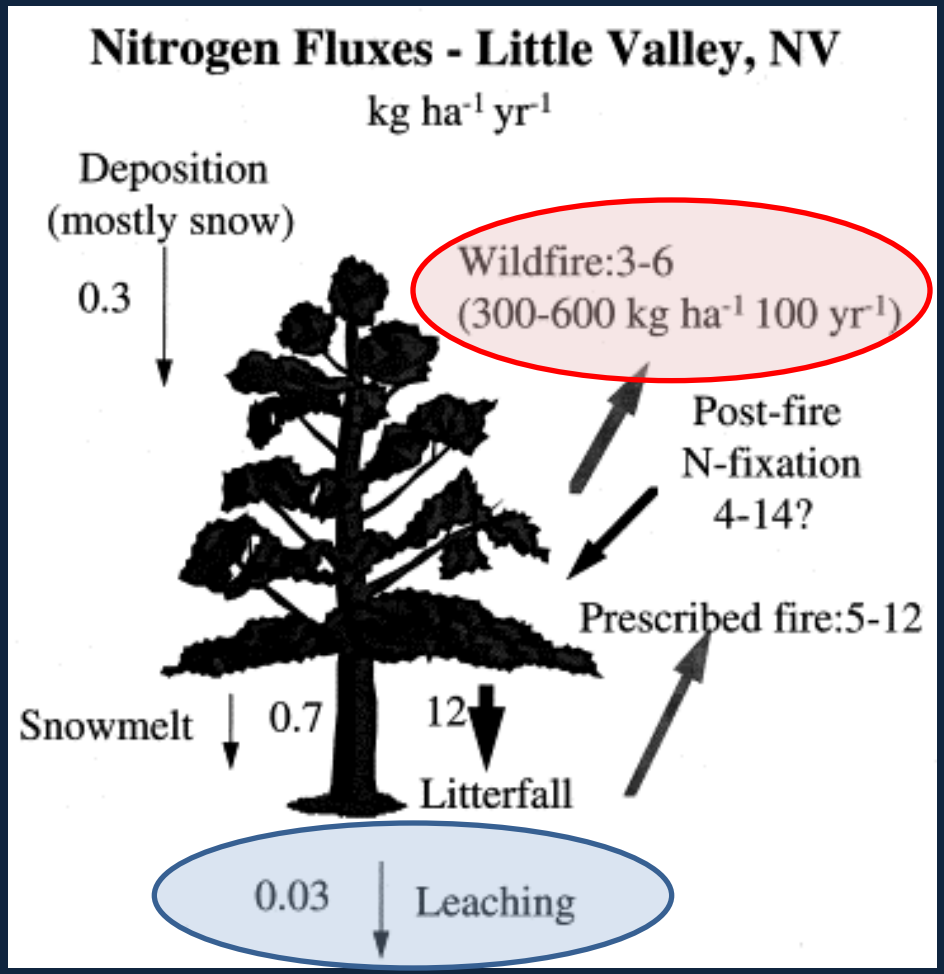
Jane Van Gunst

Historical changes in disturbance regime



Importance of fire v water to N cycling

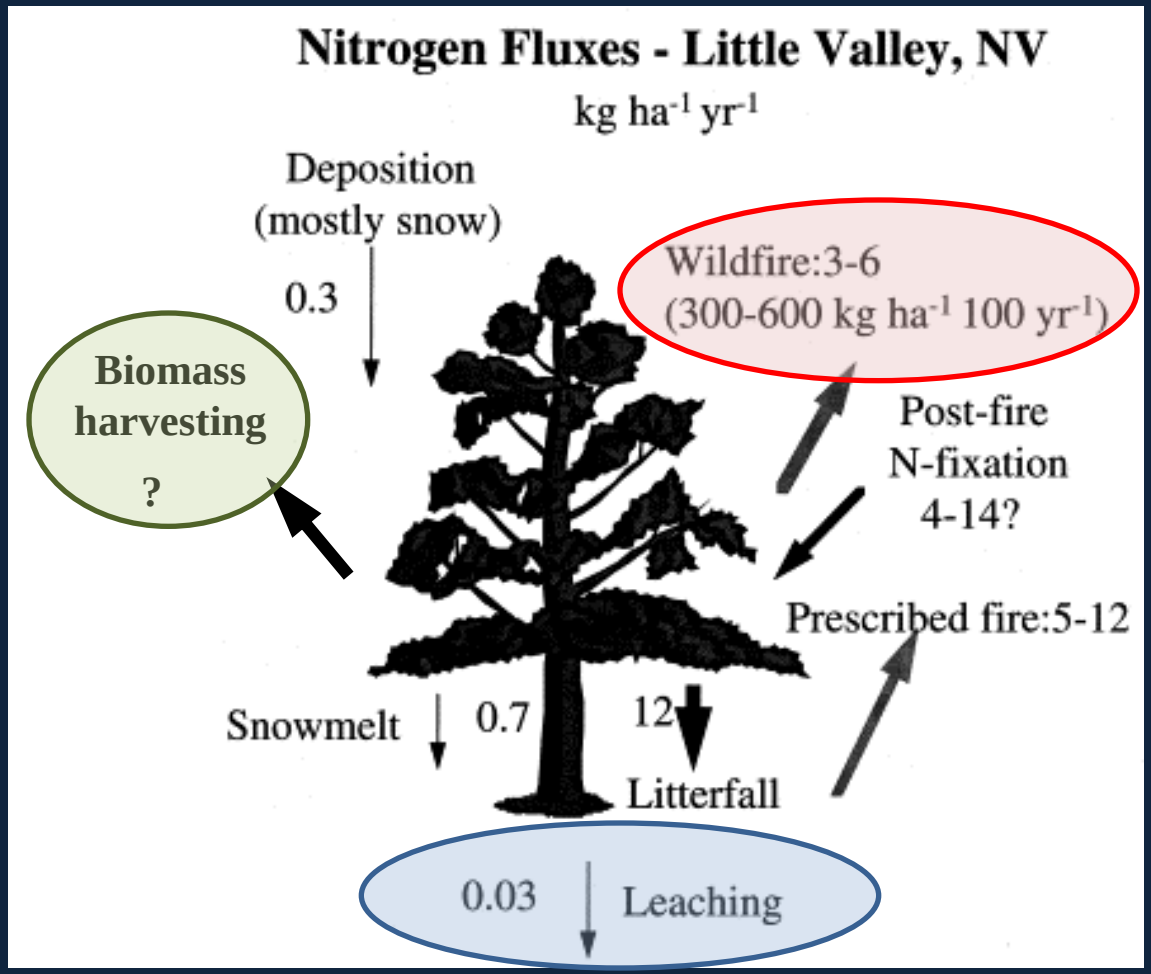
- Constraints
  - Semi-arid forests
  - Frequent fire



Johnson et al. 1998

Extension to biomass harvesting

- Harvesting removes N-poor wood



Modified from Johnson et al. 1998

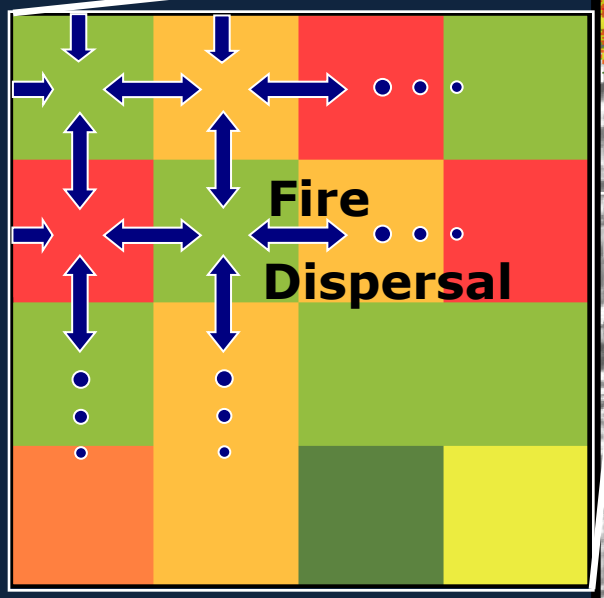
Questions

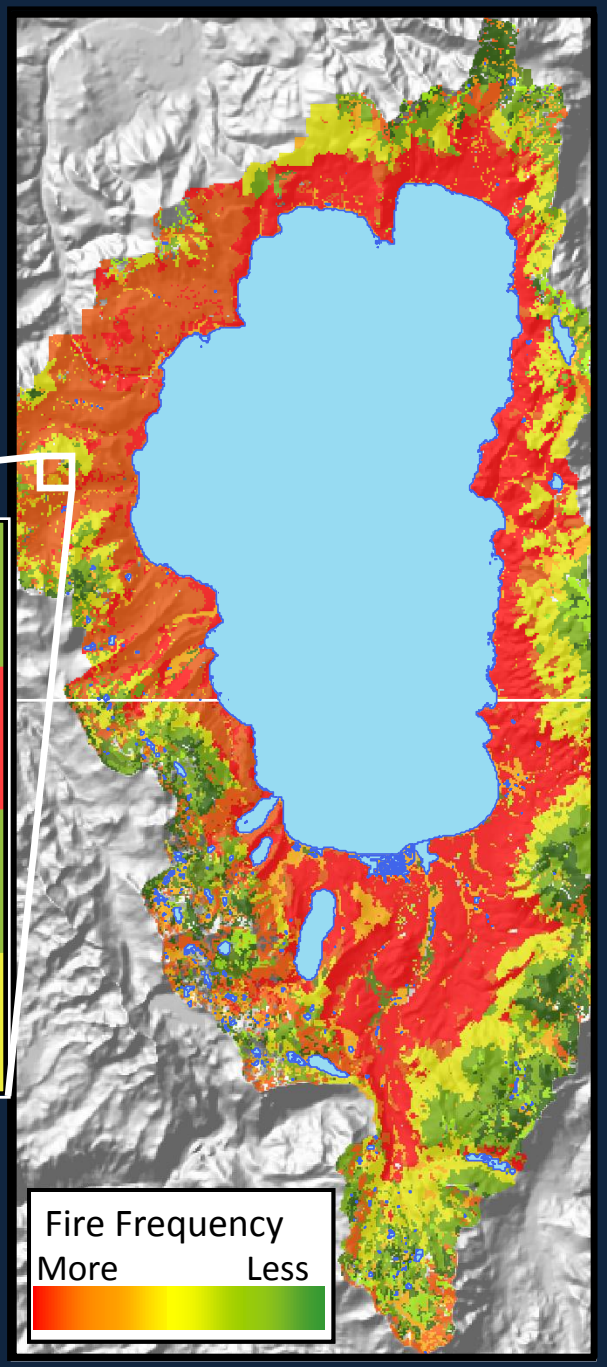
- How has the changing disturbance regime affected N cycling?

- To what extent does biomass harvesting restore N cycling processes?

Simulation modeling

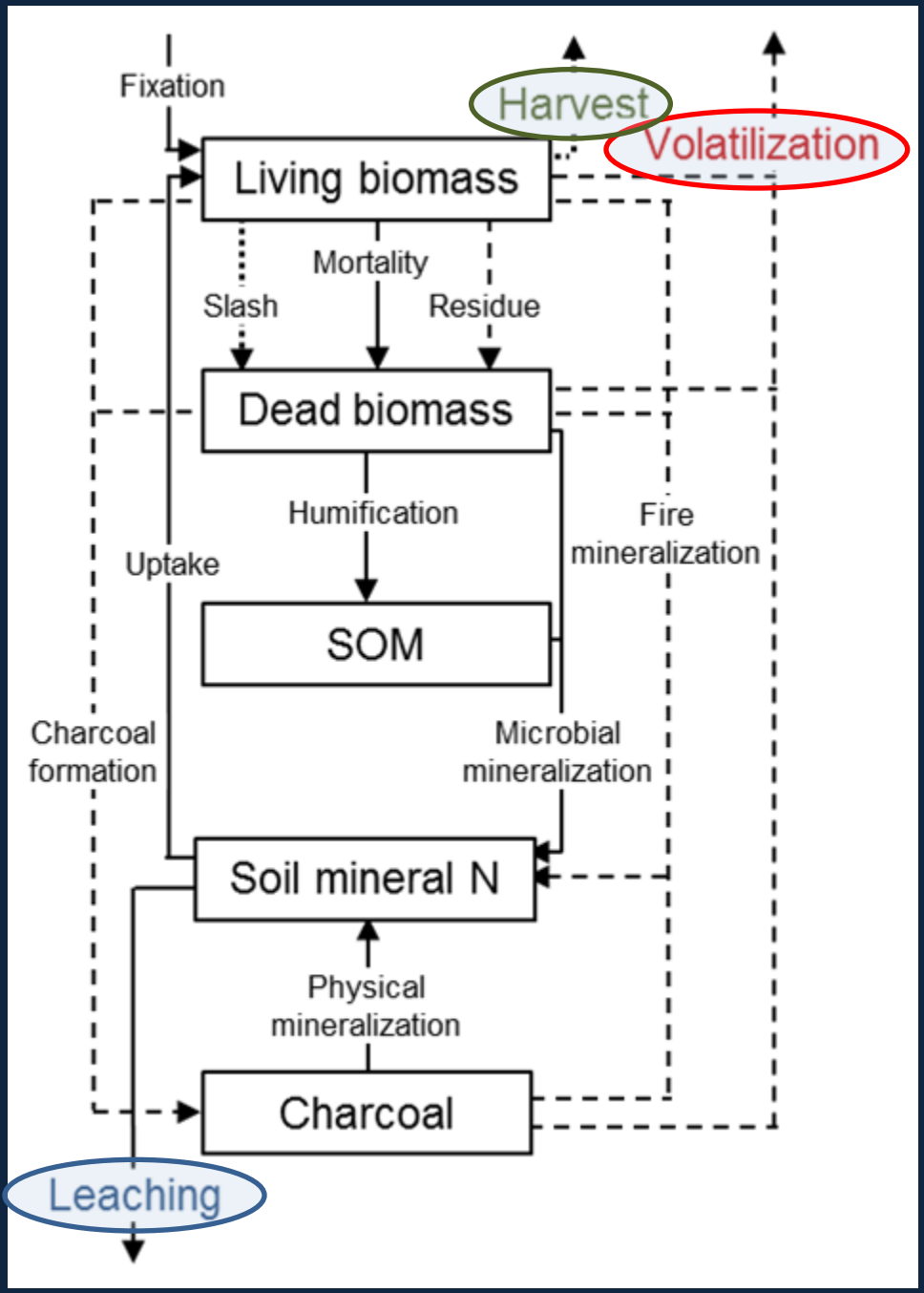
- LANDIS-II forest landscape model





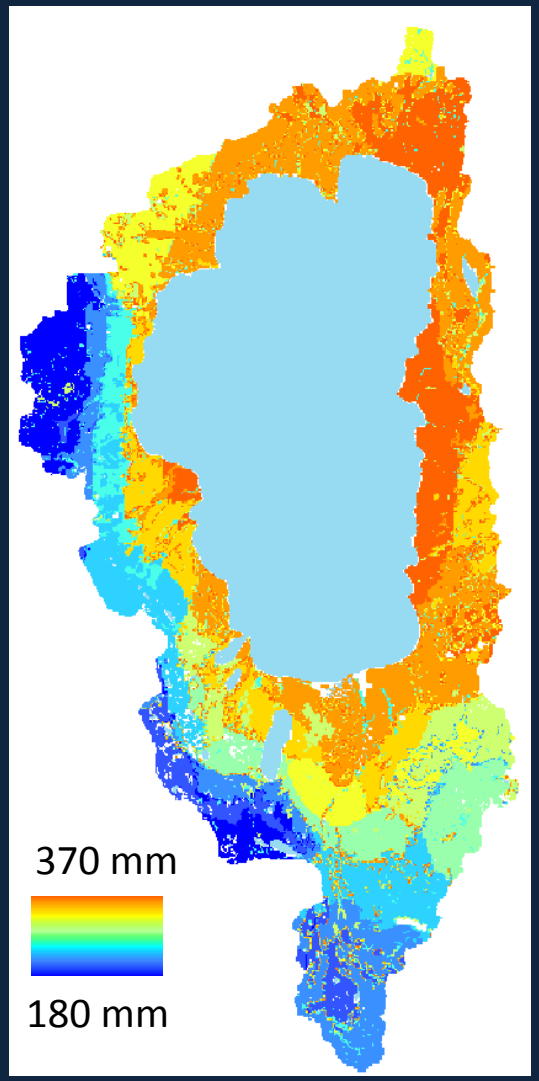
Nutrient cycling

- NuCycling-Succession
  - C
  - N
  - P

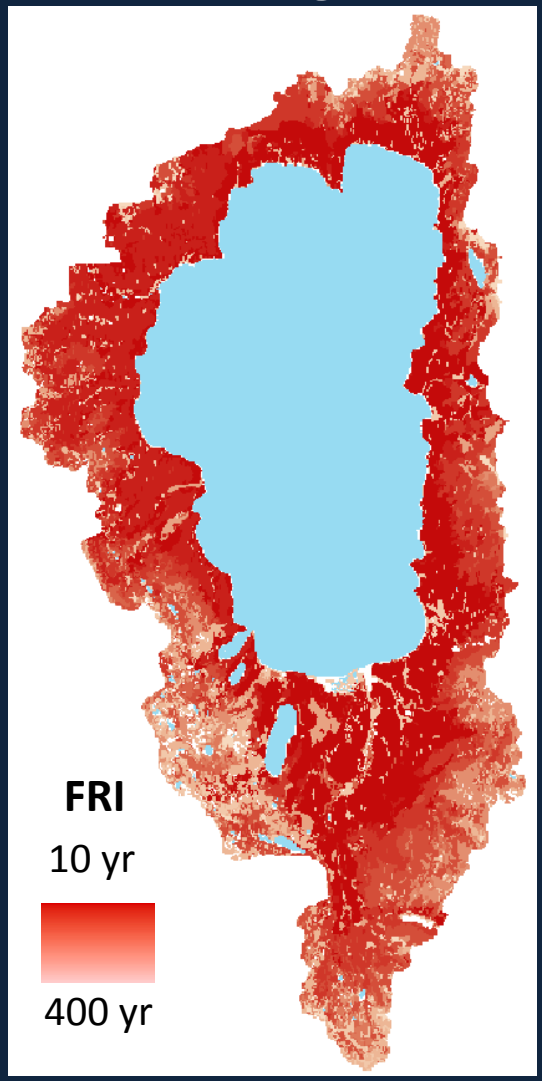


Lake Tahoe Basin

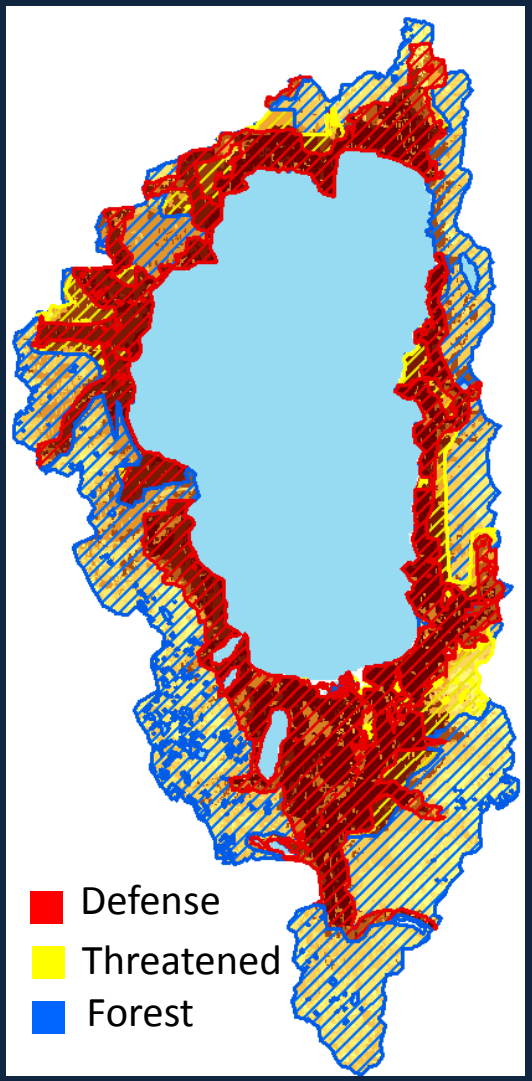
AET



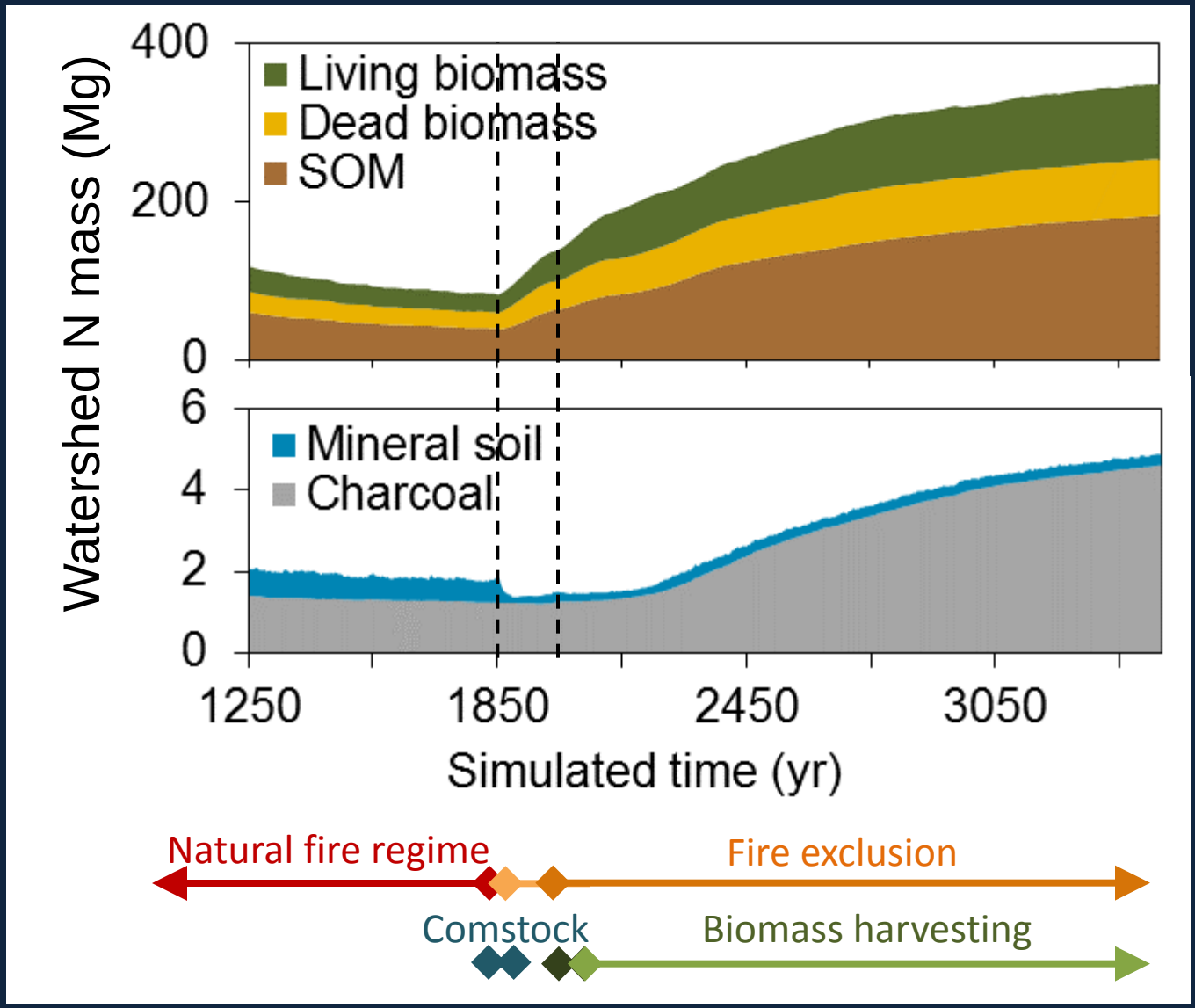
Fire regime



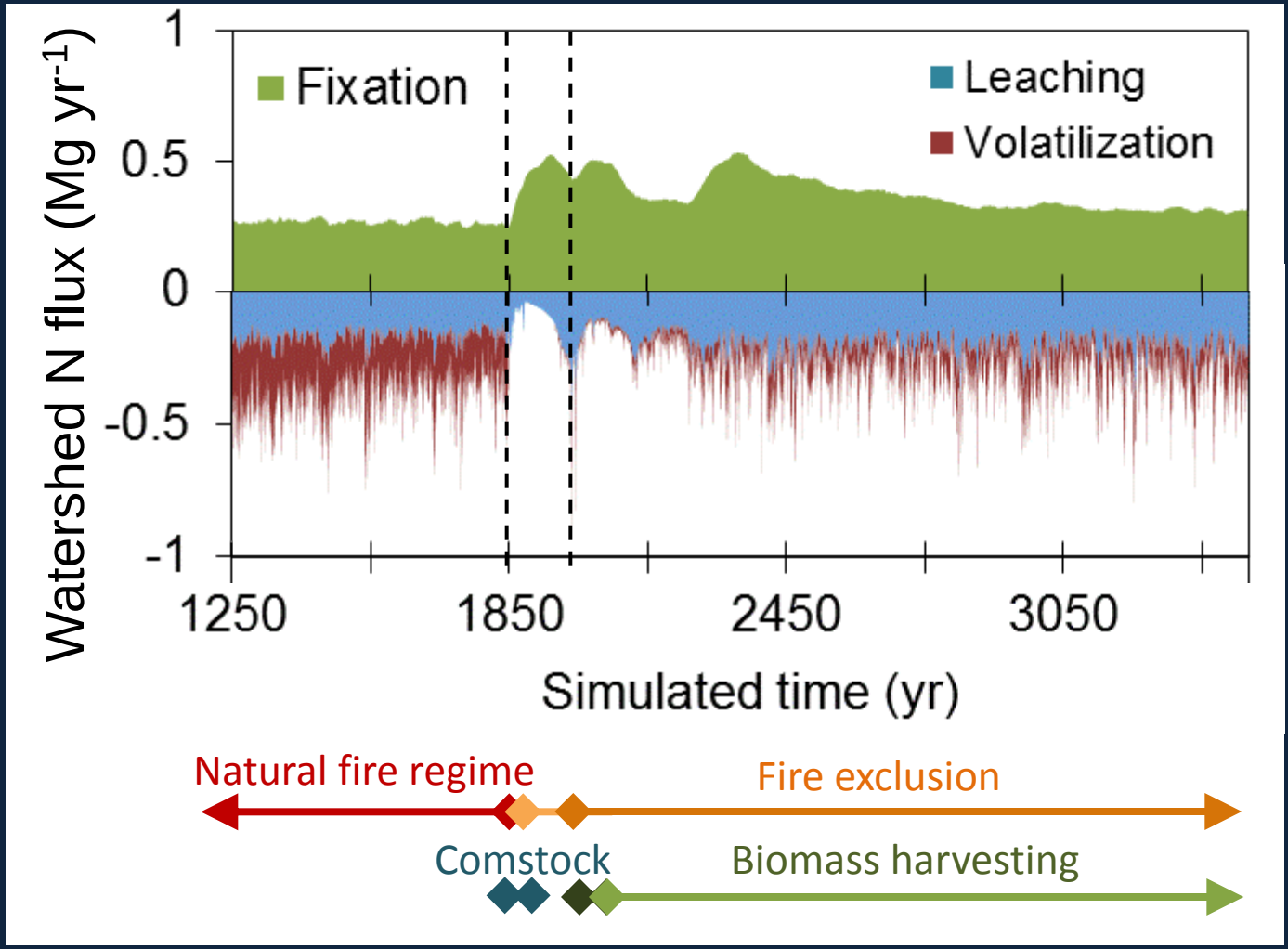
Management



Watershed scale: nutrient pools

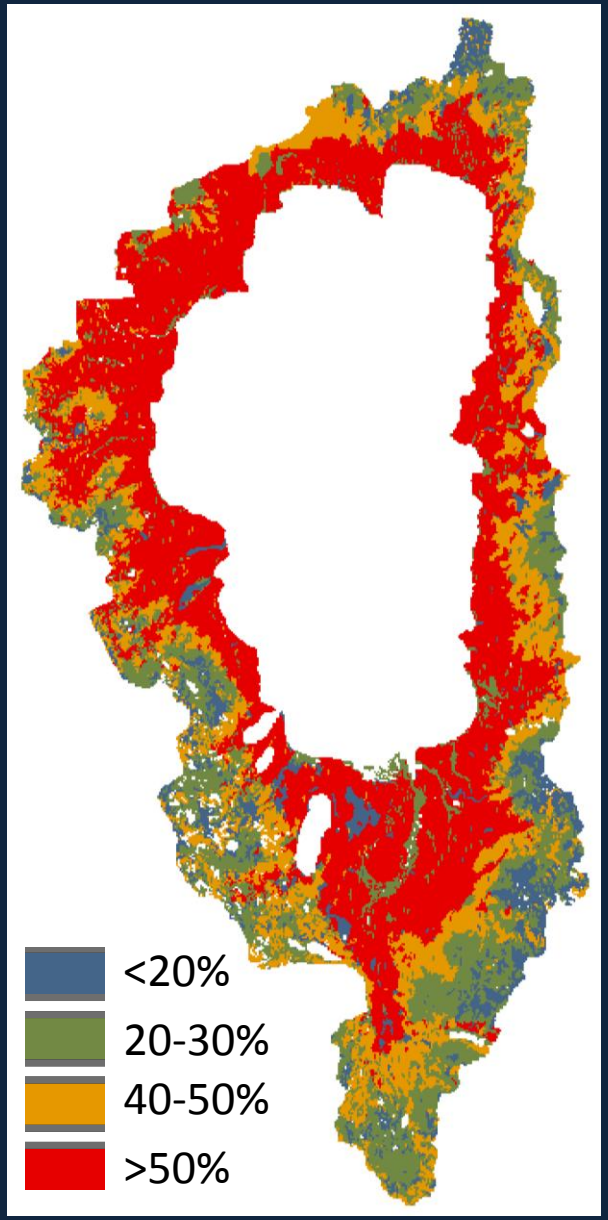


Watershed scale: ecosystem flux

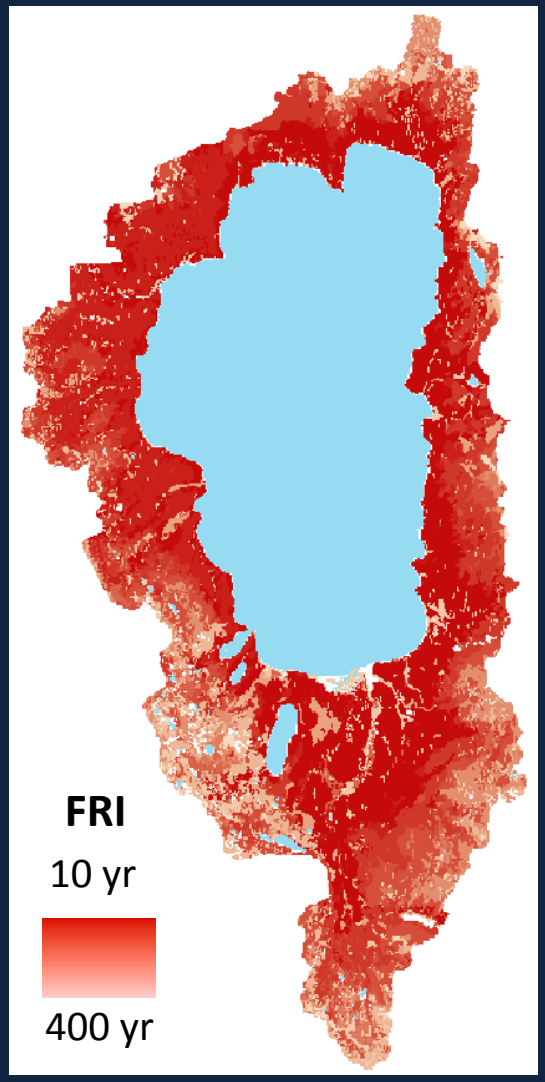


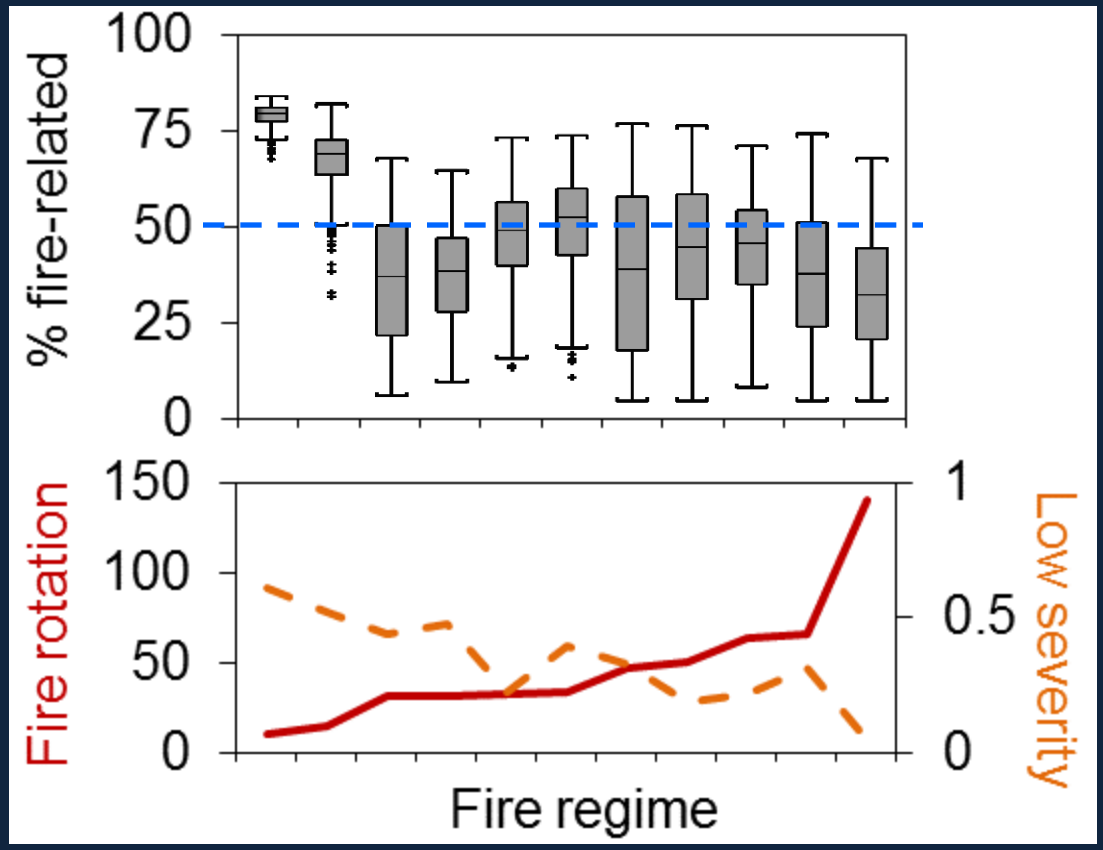
Fire-related proportion

- Spatial pattern

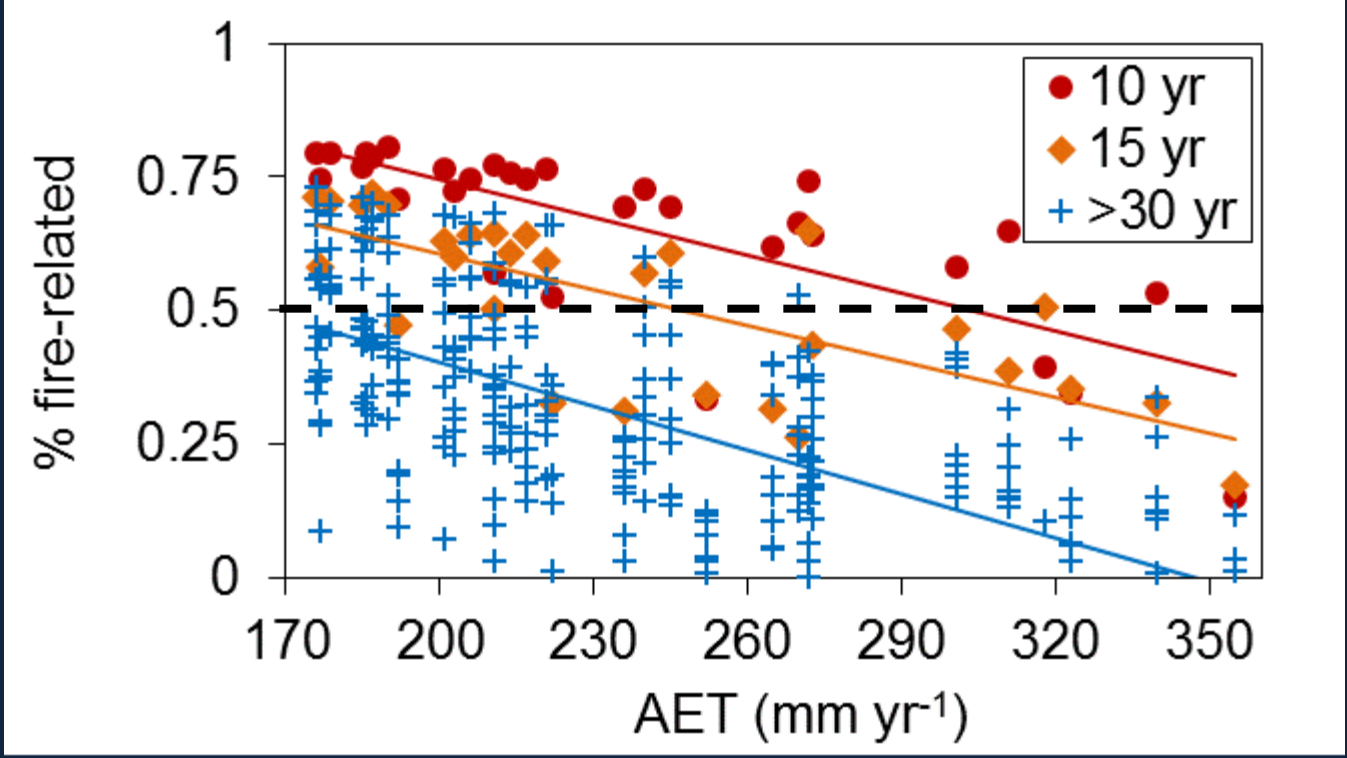


Effects of historical fire regimes





Effects of fire regime & AET

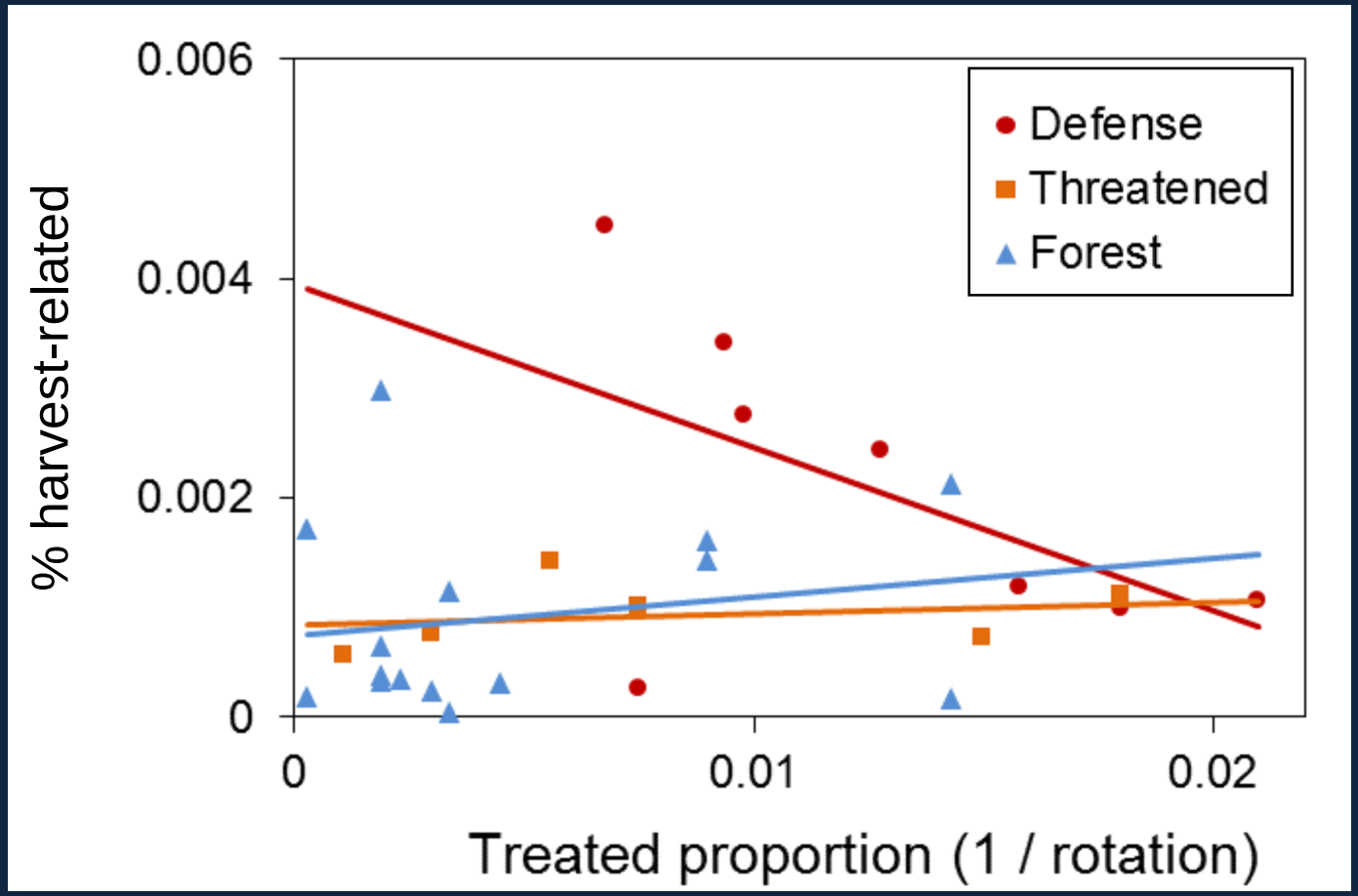


Fire rotation = 10 yr, AET < 320 mm yr^{-1}

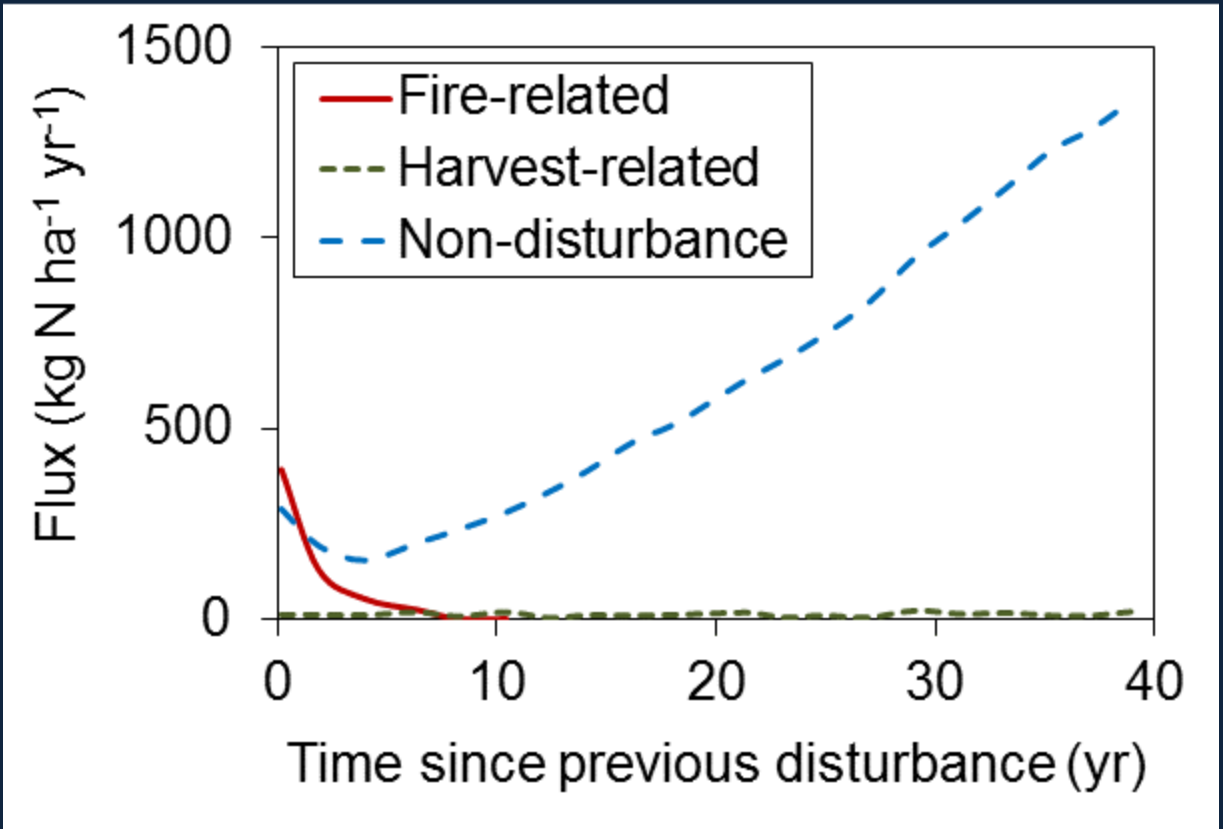
Fire rotation = 15 yr, AET < 245 mm yr^{-1}

Fire rotation = >30 yr, AET < 210 mm yr^{-1}

Harvest-related proportion

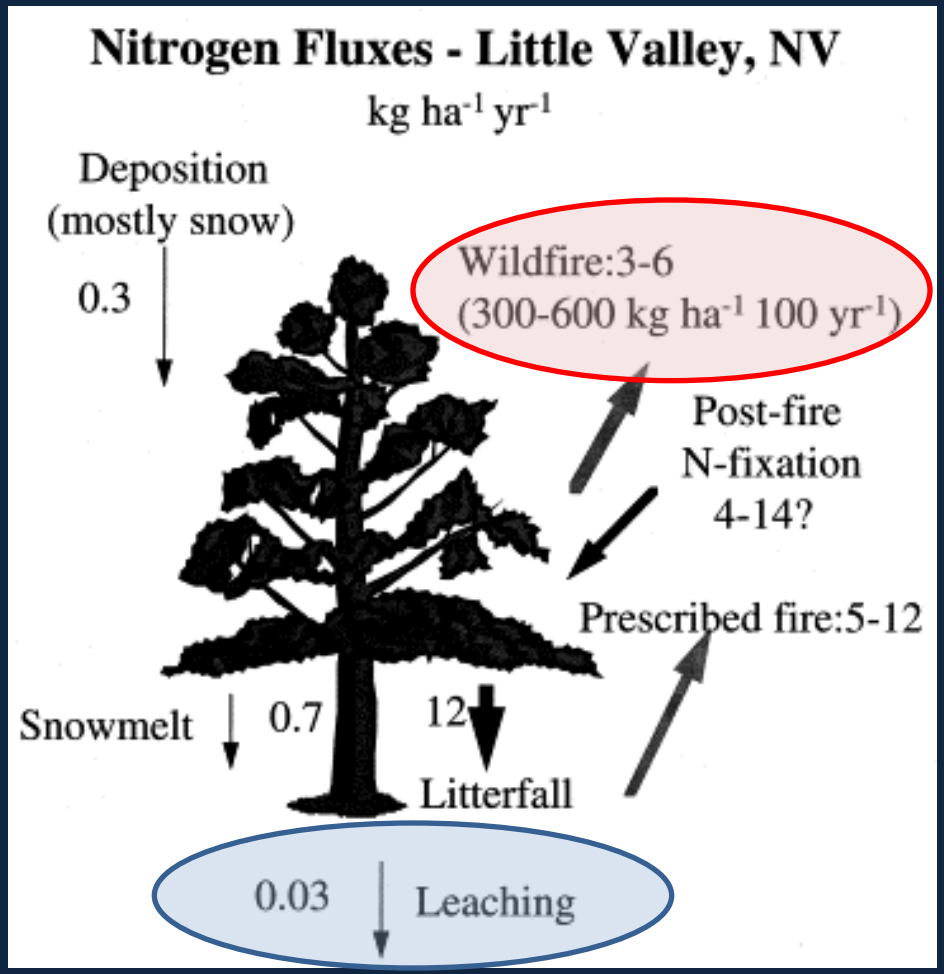


Temporal effects of disturbance



Conclusions

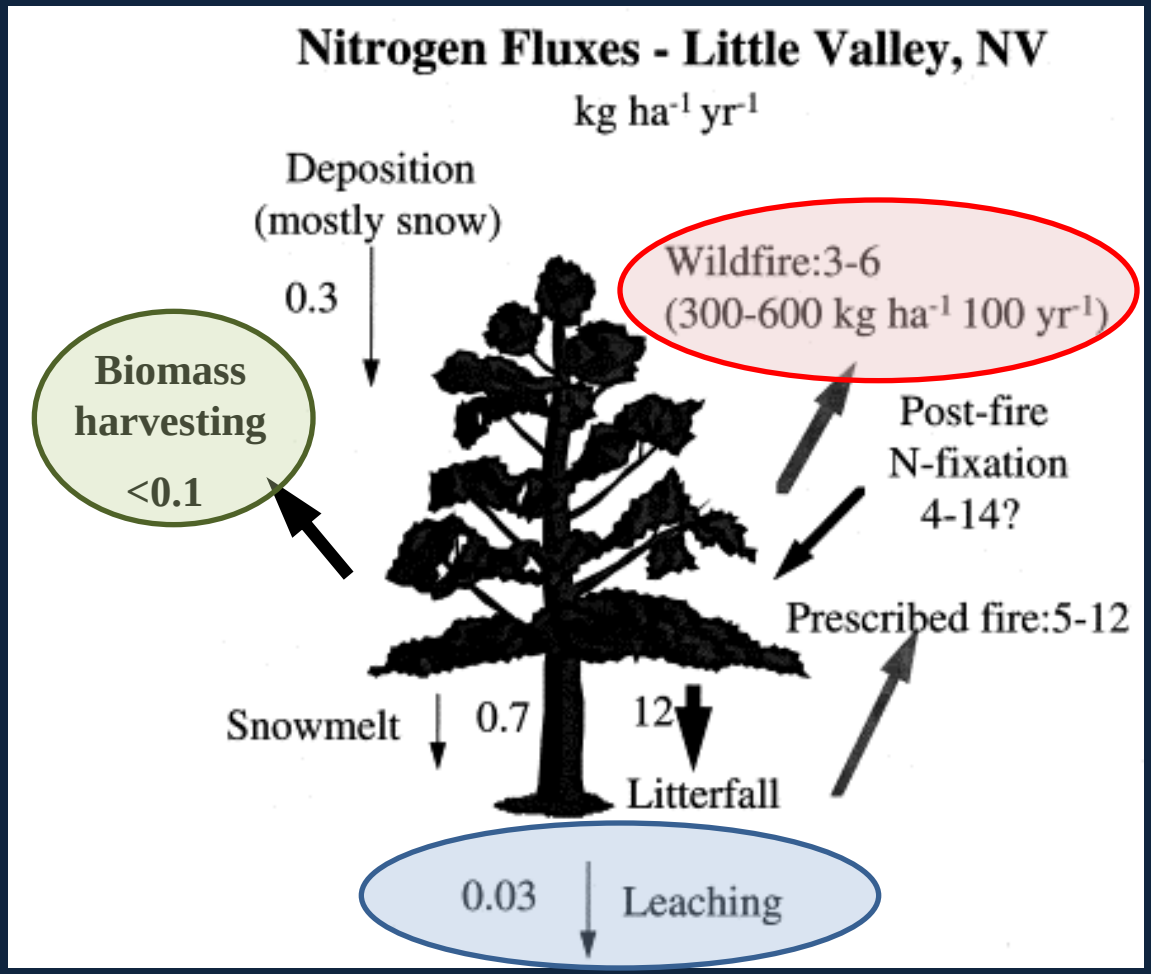
- Fire-related N fluxes can exceed water-related N fluxes
  - Spatial conditions
    - Fire rotation x AET
  - Temporal conditions
    - ≤3 yr after fire



Johnson et al. 1998

Conclusions

- Biomass harvesting ≠ natural fire regime



Modified from Johnson et al. 1998